the ravages of the olive fly. Hence the quantity of olive oil obtained this season in Tuscany has been insignificant, while the quality of most of it is distinctly inferior. A full crop of olive oil may be reckoned at a money value of some 10,000,000*l.*

The olive maggot—which subsequently develops into the olive fly—destroys the pulp of the fruit, and so potent are the ravages of this pest that it is capable of diminishing the yield of oil by one-half, and seriously injuring the quality of the remainder. It will therefore be seen that the fly may actually cause damage in one year amounting to 5,000,000*l.* Notwithstanding the urgency of the matter, no means of destroying the insect appear so far to have been discovered, nor has the State suggested any practical remedy. The subject is recommended to the notice of English men of science, as any discovery which should exterminate the plague ought certainly to be profitable. What seems to be wanted is that entomologists of experience should carefully study the habits of the fly with a view to finding out the hitherto undiscovered winter habitat. Then alone could proper steps be taken for its destruction. It has been hazarded with some likelihood that the winter habitat of the fly must be in the bark of the olive trees. If that were the case, all that would be needed would be to paint the trees during the winter with a simple solution of lime, which, though it might spoil the beauty of the Italian landscape, would rid the country of a very formidable enemy to its agricultural prosperity.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Two University lectureships in experimental physics are now vacant. The appointment is for five years, and the stipend 50*l.* a year. Applications should reach the Vice-Chancellor by June 2.

The researches of Mr. L. N. G. Filon, advanced student, of King's College, in relation to certain problems in applied mechanics, have been approved as a qualification for the B.A. degree.

Sixty-three men and nineteen women have acquitted themselves so as to deserve honours in the Mathematical Tripos, Part I.

Honorary degrees will, on June 12, be conferred on the Earl of Rosse, F.R.S., Sir Benjamin Baker, F.R.S., Sir W. L. Buller, F.R.S., Prof. S. P. Langley, Prof. W. M. Flinders Petrie and Prof. H. Poincaré.

The graces for the establishment of a new special examination in agricultural science for the B.A. degree was opposed on May 24, but it was carried by a large majority. The first examination will take place at the end of the year.

ONE of the chief difficulties which has to be overcome by Technical Education Committees is the defective character of elementary education, respecting which lament is very general. Several instances of this difficulty are given in the current number of the *Record of Technical and Secondary Education.* The Durham committee have been compelled for some years to give financial assistance to preparatory classes now formed in all but twenty-one districts of the county. The committee have by such means paved the way for their new regulation of 1899 that there must be "the production of evidence of preparatory training on the part of all new applicants on whom attendance grants would be claimed." This action already appears to be having a satisfactory effect. The Cambridgeshire, Nottinghamshire and Staffordshire committees also deal at some length with the question of defective elementary education. The Cambridgeshire committee go so far as to say:—"The very backward state of elementary education has made it extremely difficult, if not impossible, to establish a system of technical education in the proper sense of the term." The Staffordshire committee speak of it in its relation to "the early age at which pupils leave the elementary schools," and this has thrown upon them "much elementary and preparatory work which otherwise would have been unnecessary." The importance of promoting the efficiency of the work of evening continuation schools cannot be too strongly urged, as they largely constitute the foundation of the work of Technical Education Committees and thus lead on to higher and specialised instruction.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, May 25.—Prof. J. D. Everett, F.R.S., Vice President, in the chair.—Prof. S. P. Thompson showed some experiments illustrating the aberration called Coma. If a converging lens is placed obliquely in a parallel beam of light, instead of giving a point image, it produces unilateral distortion, and the bright central spot is accompanied by a pear-shaped tail, which is known as a coma. The direction in which this tail points depends upon the side of the lens which is presented to the light. With a concavo-convex lens the convex surface gives an inward pointing coma, and the concave surface an outward pointing coma. The existence of this phenomenon is due to unequal magnification from different zones of the lens, a fact which was shown by covering the lens with a zone-plate of three or four rings and viewing on a screen the distorted images of the several zones. The form of a coma varies greatly with the distance of the screen from the lens. A parallel beam of light which has passed obliquely through a convex lens is capable of producing some curious shadows. The shadow of a rod can be obtained as a circular spot, and that of a grating, made by stretching threads between two rods, as concentric circular rings. Prof. Thompson also showed a stringed model illustrating the paths of light-rays in the formation of a coma.—Mr. R. T. Glazebrook then read some notes on the measurement of some standard resistances. Three methods have been employed by the author for building up multiples of a standard resistance, such as a one-ohm coil. The first method consists in making as accurately as possible three three-ohm coils. These in parallel can be compared directly with the standard by Carey Foster's method. Their resistance in series is very approximately nine times that in parallel, and hence an accurate determination of a resistance about nine ohms can be obtained. If, then, this resistance is put in series with the standard, an accurately-known ten-ohm resistance is obtained. By a similar process, a hundred- or a thousand-ohm coil can be built up. The second method consists in calibrating a resistance-box. The one-ohm coils of the box are compared directly with the standard, and the other resistances determined accurately by a building-up process, using a subsidiary resistance-box. In comparing the high resistances, the difference between the two boxes may be so great as to send the balance off the bridge wire. In these cases the third method is employed. The equal arms of the bridge are accurately known, and one of them is shunted with a resistance, which need not be accurately known, until the reading is brought back on to the wire. The coils chiefly used throughout the experiments are made of platinum-silver.—Mr. J. J. Guest read a paper on the strength of ductile materials under combined stresses. The author throughout his experiments has used the "yield point" of a material as the true criterion of its strength, and has rejected the elastic limit as being modified by local yielding. At present, two theories are used in the calculation of strengths of materials. The first is that the material yields when one of the principal stresses reaches a certain amount. This theory, which was adopted by Rankine and is used by engineers in England and America, is not in accord with recent experiments. The second theory is that the material yields when the greatest strain reaches a certain amount. This was advocated by St. Venant, and is used by engineers on the Continent. Besides these there is a third theory of elastic strength, in which the condition of yielding is the existence of a shearing stress of a specific amount. In the case of a solid bar subjected to torsion, there is a variation in the strain from the axis outwards, and consequently the materials have been used in the form of thin tubes. This allows the application of an internal fluid pressure. The specimens were of steel, copper and brass, the state of set caused by drawing having been removed by annealing. The tubes were subjected to (1) torque, (2) torque and tension, (3) tension only, (4) tension and internal pressure, (5) torsion and internal pressure, and (6) internal pressure only. The axial elongation, the twist, and occasionally the circumferential strain were measured. Towards the end of the experiments observations were made on bending. The results disprove the maximum stress theory, and are at variance with the maximum strain theory. The maximum shearing stress developed, and the corresponding shearing strain were comparatively constant throughout the experiments, and no other simple relation between the stresses or strains was even approximately constant. The results

of the experiments have been plotted synoptically on a curve, and the several lines have been drawn upon which these points should lie, according to the various theories. It is readily seen that the points cluster round the line which represents the existence of a specific shearing stress. The author, therefore, favours the existence of this stress for any material. The chairman read a communication upon the subject from Dr. Chree. Mr. Guest, in his paper, has regarded the shearing stress theory as a little known one. As the shearing stress is half the difference between the greatest and least principal stresses, this theory is the same as Prof. G. H. Darwin's maximum stress-difference theory. All the theories suppose that the stress-strain law is linear, and that strains are so small that their squares and products can be neglected. Mr. Guest concludes that in ordinary materials the law is linear to the elastic limit, which answers to a stress lower than that which answers to the yield point, and that yield point phenomena arise between these. Nevertheless, he focusses attention on the yield point as the criterion of strength, and assumes that Hooke's law holds up to it.

Entomological Society, May 2.—Mr. W. L. Distant, Vice-President, in the chair.—Mr. W. L. Distant exhibited the cocoon, measuring nearly three and a half inches each way, of a Coprid beetle—probably belonging to the genus *Heliocopris*—found at Pretoria in the Transvaal.—The Rev. Theodore Wood exhibited a specimen of *Carabus auratus*, L., taken in either June or September 1898 by Mr. Ferrand, of Littlefield House, Exmouth, on the Haldon Hills in the neighbourhood of that town.—Mr. McLachlan exhibited an example of *Rhinocyphea fulgidipennis*, Guérin, a brilliant little dragon-fly of the subfamily *Calopteryginae*, a native of Cochin China, which, so far as he knew, had not been captured since prior to 1830. It had been in M. Guérin's hands, and Mr. McLachlan had received it from M. René Oberthür.—Mr. T. A. Chapman exhibited various specimens illustrating *Acanthopsyche opacella*.—Mr. Barrett exhibited specimens of Heterocera destructive to the fruit crops of South Africa. Among them *Sphingomorpha monteironis*, Butl., known as the Fruit Moth in Cape Colony—a bold and powerful insect, with a sucking tongue strong enough to pierce the sound skin of a peach or fig. The presence of a light does not appear to disturb it, so that examination of its methods can be readily made, when it can be seen that it does not take advantage of the natural opening into a fig, or of a crack or other injury to a peach, but deliberately pierces a hole which afterwards shows as a small round spot, from which decay invariably results. It seems a matter of indifference to the moth whether the fruit has fallen, or is on the tree, ripe or unripe. With regard to *Achaea lienardi* and *Serrodes inara*, the two species are restless and timid, and therefore more difficult to observe. In the present season, however, both have been extremely abundant, and have been seen at apparently uninjured fruit, so that it seems they are capable of equal destruction. Several others, feeding mainly on damaged fruit, were also taken with the aforesaid species, among them some new to science, and recently described by Sir George Hampson. Mr. Jacoby exhibited *Callomorpha wahlbergi* from Africa, and *Spilopyra sumptuosa* from Australia.—A paper was communicated on "New Palæarctic Pyralidæ," by Sir George F. Hampson, Bart.

Anthropological Institute, May 15.—Mr. C. H. Read, President, in the chair.—The president alluded to the severe loss which the Institute and anthropology in general had sustained in the loss of its former president, the late General Pitt-Rivers.—Mr. F. Haverfield contributed a note on certain stone objects discovered on a Roman site at Clanville, in Hants, and a discussion ensued from which it appeared improbable that they were of human workmanship.—Mr. J. Allen Brown described a collection of stone implements brought from Pitcairn Island by Lieut. Pike, R.N. The implements are of two types, both formed of the volcanic rocks of the island. The first series consists of stone axes of analogous forms to those of other islands of the Pacific. The other is peculiar, being large, and with incurved sides and broad cutting edge, more or less ground as well as chipped. A third form is that of a cylindrical chisel. The author mentioned also the discovery of rock carvings of sun, moon, birds, &c., tombs with pottery and human skulls, and of carved stone figures like those of Easter Island. The fact that the implements were found below the surface of the ground, and that from the time of its discovery by Carteret until its occupation by the mutineers of the *Bounty*, makes it probable that the remains in question are of considerable age.—Mr. H. Stopes exhibited a number of unclassified stone objects which he had collected from the river gravels of the Thames valley, and discussed the purposes for which he believed them to have been shaped. He also produced specimens of *Neritina flaviatilis* found in the same gravels, which he regarded as an indication of their age.

Zoological Society, May 22.—Dr. Albert Günther, F.R.S., Vice President, in the chair.—A communication was read from Prof. G. B. Howes, F.R.S., and Mr. H. H. Swinnerton, on the development of the skeleton of the Tuatera, *Sphenodon* (*Hatteria*) *punctatus*, which was stated to be the outcome of eighteen months' work on materials supplied to the authors by Prof. Dendy, of Christchurch, N.Z. An account was given of the egg, the hatching, and the habits of the hatched young, which the authors reared till four months old.—The Malacostracan Crustacea collected by Mr. Rupert Vallentin at the Falkland Islands, from December 1898 to February 1899, formed the subject of a paper by the Rev. T. R. R. Stebbing, F.R.S. Many of the species had long been known, as several scientific expeditions had been made to these islands during this century. This carefully made collection, however, had afforded a much needed opportunity for discussing and clearing up obscure points in some of the earlier descriptions of the Crustacean fauna.—Mr. L. A. Borradaile read the fourth instalment of his memoir on Crustaceans from the South Pacific. This part contained an account of the crabs, of which 77 species were enumerated. Seven new species were described, and a scheme of classification of the swimming crabs (*Portunidae*) was put forward.—A communication was read from Dr. R. Bowdler Sharpe, which contained an enumeration of the birds—56 species in all—collected during the Mackinder Expedition to Mount Kenya, accompanied by field-notes of the collectors.—Mr. F. E. Beddard, F.R.S., read a paper, entitled "A Revision of the Earthworm Genus *Amyntas*." According to the author, this genus comprised 102 species, which were enumerated and commented upon.—Mr. Beddard also read a paper on the structure of a new species of earthworm, which he proposed to name *Benhamia budgetti*, after its discoverer, Mr. J. S. Budgett, who had obtained two specimens of it at M'Carthy's Island during his recent visit to the Gambia.

PARIS.

Academy of Sciences, May 21.—M. Maurice Lévy in the chair.—Researches on the formation of nitric acid during combustions, by M. Berthelot. The compressed oxygen used in combustions in the calorimetric bomb always contains a small quantity of nitrogen, up to 8 per cent. A portion of this is oxidised during the combustion, and the amount of nitric acid so formed has been regularly measured in order to correct the calorimetric data. The author now attempts to trace the relation between the nature of the organic substance under combustion and the quantity of nitric acid formed, details being given in the present paper of experiments on amorphous carbon, graphite and diamond.—Limits of combustibility by red-hot copper oxide of hydrogen and methane diluted with large volumes of air, by M. Armand Gautier. When combustible gases, such as hydrogen or marsh gas, are mixed with large quantities of air and are passed over columns of red-hot copper oxide, the difficulty of completely burning the gas increases with the dilution. Thus with a dilution of 20 parts in 100,000, hydrogen is not completely burnt on passing over a column of 35 centimetres of red-hot copper oxide, but combustion is complete when this length is doubled. Methane is more difficult to burn; thus at a dilution of 7 in 100,000 nearly half the carbon escaped unburnt after passing over a column of oxide 70 cm. long.—Publications of the Observatory of Besançon from 1886 to 1896, by M. Lœwy.—Action of hydrogen bromide upon dextro-rotatory benzylidene camphor, by MM. A. Haller and J. Minguin. Benzylidene camphor combines with hydrobromic acid to form mono-bromo-benzyl-camphor. If the combination is carried out at 100°, two other products are obtained, benzylidene-campholic acid,

$$(COOH).C_8H_{14}.CH{:}CH.C_6H_5,$$

and phenyloxy-homocampholic acid,

$$(COOH).C_8H_{14}.CH_2.CH(OH)C_6H_5,$$

derivatives of which are described.—On fossil forests and the vegetative soils of the coal-measures, by M. Grand'Eury. Further arguments in favour of the author's view that the vegetable fossils have really grown in the places where they now occur, and have not been deposited there by water.—

Report on works presented by M. Marx.—Remarks on an eruption of the volcano Mayon in the Isle of Lucon, by the French Consul for the Philippines.—On the convergence of the coefficients in the development of the perturbation function, by M. A. Férand.—Remarks on a memoir of M. Massau on the graphical integration of some partial differential equations, by M. J. Coulon.—On a remarkable point in relation with the Joule-Thomson effect, by M. Daniel Berthelot. The point at which the inversion of the Joule-Thomson effect occurs is deduced by a graphical construction from the data of Amagat, and the result compared with some recent calculations of M. Van der Waals.—On the distribution of currents and potentials in the periodic state set up in the length of a symmetrical polyphase line presenting capacity, by M. Ch. Eug. Guye.—On resonance in wireless telegraphy, by M. A. Blondel. —Communication by wireless telegraphy with the aid of radioconductors with polarised electrodes, by M. C. Tissot.—On anhydrous calcium dioxide and the constitution of its hydrates, by M. de Forcand. A thermochemical paper.—On some properties of aluminium, and on the preparation of gaseous hydrogen phosphide, by M. Camille Matignon. Details are given showing how to burn aluminium in steam, carbon monoxide and dioxide, oxides of nitrogen, formic acid, sulphur dioxide and other gases and vapours. The preparation of crystallised aluminium phosphide is described, from which pure PH_3 can be readily obtained.—Combinations of lithium bromide with ammonia, by M. J. Bonnefoi.—The compounds $LiBr.NH_3$, $LiBr.2NH_3$, $LiBr.3NH_3$, $LiBr.4NH_3$ are indicated by a study of the dissociation pressures. The application of the Clapyron formula to these data gives values for the heats of dissociation of these compounds in good agreement with the direct thermochemical measurements.—On two polysulphides of lead and copper, by M. F. Bodroux. The compounds PhS_5 and Cu_2S_5 are described.—On a mercury chlorosulphide, by M. F. Bodroux. A chlorosulphide, $Hg_2S_5.HgCl_2$, can be prepared, which is stable at ordinary temperatures.—Action of water upon mercurous sulphate, by M. Gouy.—Partial synthesis of lævo-rotatory erythritol, by M. L. Maquenne. Wohl's method is applied to xylose, the steps being xylosoxime, acetylxylonic nitrile, erythose-acetamide, and erythrite.—Preparation of the dialkylamido-dichloranthraquinones, by M. E. C. Severin.—On a monoiodohydrin of glycol, by MM. E. Charon and Paix-Séailles.—On γ-chlorocrotonic acid, by M. R. Lespieau. A description of the properties of $CH_2Cl.CH:CH.CO_2H$, its nitrile and ethyl ester.—On the composition of the albumen of the St. Ignatius bean and of the *nux vomica* bean, by MM. Em. Bourquelot and J. Laurent. The albumen from these beans yields the same carbohydrates, a mixture of a mannane and a galactane, as the albumen of leguminous beans previously studied. In *nux vomica* the proportion of galatose found on hydrolysis is very high. These beans, in fact, serve as an advantageous source of crystallised galatose. —Experimental researches upon the evolution of the lamprey, by M. E. Bataillon.—Remarks upon certain points in the life-history of the lower organisms, by M. J. Kunstler.—On some new Synclavellæ in the compound Ascidians, by M. Maurice Caullery.—Analysis of marine deposits collected off Brest, by M. J. Thoulet.—The mineral matters in the human fœtus during the last five months of pregnancy, by M. L. Hugonenq. —Identity of a bacillus from milk with the pneumobacillus of Friedlænder, by MM. L. Grimbert and G. Legros. The complete identity of these bacilli was shown by a comparative study of their general biology and morphology, and of their action upon carbohydrates.

DIARY OF SOCIETIES.

THURSDAY, MAY 31.

ROYAL SOCIETY, at 4.30.—Palæolithic Man in Africa: Sir John Evans, F.R.S.—On the Estimation of the Luminosity of Coloured Surfaces used for Colour Discs: Sir W. de W. Abney, F.R.S.—The Sensitiveness of Silver and of some other Metals to Light: Major-General Waterhouse.—The Crystalline Structure of Metals (Second Paper): Prof. Ewing, F.R.S., and W. Rosenhain.—Vapour-density of Bromine at High Temperatures (Supplementary Note): Dr. E. P. Perman and G. A. S. Atkinson.

FRIDAY, JUNE 1.

ROYAL INSTITUTION, at 9.—Bunsen: Sir Henry Roscoe, F.R.S.

GEOLOGISTS' ASSOCIATION, at 8.—Our Older Sea Margins: Sir Archibald Geikie, F.R.S.

TUESDAY, JUNE 5.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—The Metric System of Identification used in Great Britain: Dr. J. G. Garson.

WEDNESDAY, JUNE 6.

GEOLOGICAL SOCIETY, at 8.—Mechanically-formed Limestones from Junagadh and other Localities: Dr. J. W. Evans.—Note on the Consolidated Æolian Sands of Kathiawad: Frederick Chapman.—On Ceylon Rocks and Graphite: A. K. Coomara Swamy.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Determination of Oxygen in Copper by Ignition in Hydrogen: Leonard Archbutt.—Uniformity in the Conduct of Soil Analysis: A. D. Hall.—The Adulteration of Wheaten Flour with Maize: G. Embrey.—A New Colour Reaction for distinguishing between certain Isomeric Allyl and Propenyl Phenols: Alfred C. Chapman.

ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, JUNE 7

LINNEAN SOCIETY, at 8.—On a Viviparous Syllid Worm: E. S. Goodrich. —On the Genera Phæoneuron, Gilg., and Dicellandra, Hook f.: Dr. A. Itapf.—On the Structure and Affinities of *Echiurus unicinctus*: Miss Embleton.

CHEMICAL SOCIETY, at 8.—Diphenyl- and Dialphyl-ethylenediamines, their Nitro-derivatives, Nitrates, and Mercurochlorides: W. S. Mills. —Condensation of Ethyl Acetylenedicarboxylate with Bases and β-ketonic Esters: Dr. S. Ruhemann and H. E. Stapleton.—The Constitution of Pilocarpine: Dr. H. A. D. Jowett.—The Nitrogen Chlorides derivable from *m*-Chloroacetanilide and their Transformations: Dr. F. D. Chattaway, Dr. K. J. P. Orton, and W. H. Hurtley.—Derivatives of Cyanocamphor and Homocamphronic Acid: Dr. A. Lapworth.

RÖNTGEN SOCIETY (St. Bartholomew's Hospital), at 8.—Dr. Lewis Jones will show an Influence Machine of American design.—Mr. James Wimshurst, F.R.S., will give a short statement of his work in the design and the perfecting of the several forms of his Influence Machine.—Dr. Rémy, of Paris, will show a new Localising Apparatus.

FRIDAY, JUNE 8.

ROYAL INSTITUTION, at 9.—The Effect of Physical Agents on Bacterial Life: Dr. Allan Macfadyen.

PHYSICAL SOCIETY, at 5.—On the Magnetic Properties of Iron and Aluminium Alloys, Part II.: Dr. S. W. Richardson.—Note on Crystallisation produced in Solid Metal by Pressure: W. Campbell.—On the Viscosity of Mixtures of Liquids and of Solutions: Dr. C. H. Lees.

ROYAL ASTRONOMICAL SOCIETY, at 8.

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